IN THE CLAIMS

1. (currently amended) A method for estimating a parameter of interest of an earth formation with a tool having a nuclear radiation source and a nuclear radiation detector spaced apart from the nuclear radiation source, the method comprising:

(a) activating the nuclear radiation source;

(b) defining a starting time for a processing time window at which measurements made by the nuclear radiation detector are responsive primarily to the parameter of interest;

(c) ~~defining~~ processing the measurements for determining an ending time for the processing time window at which the measurements are substantially uncontaminated by noise; and

(d) analyzing the measurements within the processing time window for estimating the parameter of interest.

2. (previously presented) The method of claim 1 wherein defining the starting time further comprises determining a time at which a value of the measurements has a predetermined relationship to an estimated value of a parameter of interest at an ending time of a processing time window for an earlier operation of said source.

3. (previously presented) The method of claim 1 wherein the nuclear radiation source comprises a pulsed neutron source.

4. (previously presented) The method of claim 1 wherein the measurements made by the nuclear radiation detector comprise gamma ray measurements.

5. (previously presented) The method of claim 3 wherein the parameter of interest comprises at least one of (i) a thermal neutron capture cross section of the earth formation, (ii) porosity, (iii)formation water salinity, and, (iv) the quantity and type of hydrocarbons contained in pore spaces.

6. canceled

7. (previously presented) The method of claim 2 wherein said relationship is of the form

$$istr = K / \Sigma$$

where *istr* is the start time of a window, K is a constant, and Σ is a capture cross section at the ending time of the processing time window for the earlier operation of the source.

8. (currently amended) The method of claim 1 wherein ~~defining~~ determining the ending time of the processing window further comprises forming a running sum of count rates starting at the starting time.

9. (currently amended) The method of claim 8 wherein ~~defining~~ determining the ending time of the processing window further comprises determining a time at which a count rate has a predetermined relation to said running sum.

10. (previously presented) The method of claim 1 further comprising partitioning the processing time window into a plurality of channels (time intervals) having a length depending upon the starting time.

11. (currently amended) An apparatus for use within a borehole penetrating an earth formation for estimating a parameter of interest of said earth formation, comprising:

(a) a nuclear radiation source irradiating the earth formation;

(b) a nuclear radiation detector spaced apart from said nuclear radiation source;

(c) a processor which

(i) defines a starting time for a processing time window at which measurements made by the nuclear radiation detector are responsive primarily to the parameter of interest; and

(ii) ~~defines~~ processes the measurements to determine an ending time for the processing time window at which the measurements made by the nuclear radiation detector are substantially uncontaminated

by noise.

12. (previously presented) The apparatus of claim 11, wherein the processor defines the starting time by determining a time at which a value of the measurements has a predetermined relation to a determined value of a parameter of interest at an ending time of a processing time window for an earlier operation of the nuclear radiation source.

13. (previously presented) The apparatus of claim 12 wherein the processor further analyzes the measurements within said processing time window and determines the parameter of interest.

14. (previously presented) The apparatus of claim 12, wherein the nuclear radiation source further comprises a pulsed neutron source.

15. (previously presented) The apparatus of claim 14, wherein the measurements made by the nuclear radiation detector comprise gamma ray measurements.

16. (previously presented) The apparatus of claim 14, wherein the parameter of interest comprises at least one of (i) a thermal neutron capture cross section of the earth formation, (ii) porosity, (iii)formation water salinity, and, (iv) the quantity and type of hydrocarbons contained in pore spaces.

17. (previously presented) The method of claim 12 wherein said relationship is of the form

$$istr = K / \Sigma$$

where *istr* is the start time of a window, K is a constant, and Σ is a capture cross section at the ending time of the processing time window for the earlier operation of the source.

18. (currently amended) The apparatus of claim 11 wherein the processor ~~defines~~ determines the ending time based on forming a running sum of count rates starting at the starting time.

19. (currently amended) The apparatus of claim 18, wherein processor ~~defines~~ determines said ending based on forming a running sum of count rates starting at said starting time.

20. (currently amended) The method of claim 19, wherein said processor ~~defines~~ determines said ending time based on determining a time at which a count rate has a predetermined relation to said running sum.

21- 28. Canceled

29. (currently amended) The ~~system~~ apparatus of ~~claim 21~~ claim 11 further comprising a conveyance device which conveys the tool into a borehole in the earth formation.

30. (currently amended) The ~~system~~ apparatus of ~~claim 21~~ claim 29wherein the conveyance device is one of (i) a wireline, (ii) coiled tubing.

31. (currently amended) The ~~system~~ apparatus of ~~claim 21~~ claim 11 further comprising a channel number generator which produces a numerical sequence of memory address codes corresponding to a sequence of adjacent time windows.

32. (currently amended) The ~~system~~ apparatus of ~~claim 21~~ claim 11 further comprising a mass storage unit associated with the processor.

33. (currently amended) The ~~system~~ apparatus of claim 31 further comprising a spectrum accumulator.

34. (currently amended) The ~~system~~ apparatus of claim 30 wherein the conveyance device comprises a wireline, the system further comprising a depth controller which provides signals indicative of a depth of said tool.